generating proposals by utilizing the input data, each said proposal comprising a collection

of bids that can be awarded to a player participating in the auction, said bids being actual bids

made and being considered simultaneously;

selecting a set of proposals such that each item is included in at most one selected

proposal; and

informing the players bidding on the items of the result of said selecting a set of proposals.

4.   (Twice Amended) A method according to claim 1, wherein said selecting a set of

proposals is enabled by using an integer programming technique.

6.   (Twice Amended) A method for selecting a set of bids in a combinatorial auction for at

least two items involving at least one player and at least one type of bid for each player such that:

(a) each item is contained in at most one (or exactly one) selected bid;

(b) for each player, the selected bids all belong to the same type;

and among all collections of bids satisfying (a) and (b) the selected bids maximizing total revenue,

said method comprising:

generating all valid proposals, said proposals comprising a collection of bids that can be

awarded to a player participating in the auction, said bids being actual bids made and being

considered simultaneously;

formulating an integer program that includes a column for each proposal, a constraint for

each item and a constraint for each player, said constraints representing conditions (a) and (b)

respectively, and an objective function which represents revenue;

solving the integer program for selecting the set of proposals that maximizes revenue;

and

constructing a set of winning bids from the set of winning proposals.

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8.   (Twice Amended) A method for selecting a set of bids in a combinational auction for at

least two items involving at least one player and at least one type of bid for each player such that

(a) each item is contained in at most one (or exactly one) selected bid;

(b) for each player, the selected bids all belong to the same type;

and among all collection of bids satisfying (a) and (b) the selected bids maximized total revenue,

said method comprising:

generating a set of valid proposals, each said proposal comprising a collection of bids that

can be awarded to a player participating in the auction, said bids being actual bids made and being

considered simultaneously;

formulating an integer program that includes a column for each proposal, a constraint for

each item and a constraint for each player, said constraint representing conditions (a) and (b)

respectively, and an objective function which represents revenue;

solving a linear programming relaxation of the integer program in said formulating an

integer program for obtaining dual variables associated with each of the constrains;

using dual variables obtained in said solving a linear programming relaxation for

determining the excess value associated with each bid, and a threshold for each player;

using a proposal generation method for selecting each player and type, a proposal for

which the excess value exceeds the threshold, or determining that no such proposal exists;

adding the proposal generated in said using a proposal generation method and repeating

said solving a linear programming relaxation, said using dual variables, and said using a proposal

generation method until no new proposals are identified;

solving the integer program that includes all identified proposals; and

constructing a set of winning bids from the set of winning proposals.

9.   (Twice Amended) A program storage device readable by a machine, tangibly

embodying a program of instructions executable by the machine to perform method steps for

executing a combinatorial auction, said method steps comprising:

reading input data comprising:

a plurality of items;

a player bidding on the items; and

a plurality of bids, where each bid specifies the player bidding, the amount bid, and

the list of items included in the bid;

generating proposals by utilizing the input data, each said proposal comprising a collection

of bids that can be awarded to a player participating in the auction, said bids being actual bids

made and being considered simultaneously;

selecting a set of proposals such that each item is included in at most one selected

proposal; and

informing the players bidding on the items of the result of said selecting a set of proposals.

10.   (Twice Amended) A computer comprising:

(1) means for reading input data comprising:

a plurality of items;

a player bidding on the items; and

a plurality of bids, where each bid specifies the player bidding, the amount bid, and

the list of items included in the bid;

(2) means for generating proposals by utilizing the input data, each said proposal

comprising a collection of bids that can be awarded to a player participating in the auction, said

bids being actual bids made and being considered simultaneously;

(3) means for selecting a set of proposals such that each item is included in at most one

selected proposal;

(4) means for informing the players bidding on the items of the results in said means for

selecting.

VERSION WITH MARKINGS TO SHOW CHANGES MADE

IN THE CLAIMS:

1.   (Twice Amended) A method for executing a combinatorial auction, the method comprising:

    [(1)] reading input data comprising:

        [(i)] a plurality of items;

        [(ii)] a player bidding on the items; and

        [(iii)] a plurality of bids, where each bid specifies the player bidding, the amount bid, and the list of items included in the bid;

    [(2)] generating proposals by utilizing the input data, each said proposal comprising a collection of bids that can be awarded to a player participating in the auction, said bids being actual bids made and being considered simultaneously;

    [(3)] selecting a set of proposals such that each item[s] is included in at most one selected proposal; and

    [(4)] informing the players bidding on the items of the result of said selecting a set of proposals.

4.   (Twice Amended) A method according to claim 1, wherein [step (3)] said selecting a set of proposals is enabled by using an integer programming technique.

6.   (Twice Amended) A method for selecting a set of bids in a combinatorial auction for at
least two items involving at least one player and at least one type of bid for each player such that:

  (a) each item[s] is contained in at most one (or exactly one) selected bid;

  (b) for each player, the selected bids all belong to the same type;

and among all collections of bids satisfying (a) and (b) the selected bids maximizing total revenue,

said method comprising:

  [(1)]   generating all valid proposals, said proposals comprising a collection of bids that can

be awarded to a player participating in the auction, said bids being actual bids made and being

considered simultaneously;

  [(2)] formulating an integer program that includes a column for each proposal, a constraint

for each item and a constraint for each player, said constraints representing conditions (a) and (b)

respectively, and an objective function which represents revenue;

  [(3)] solving the integer program for selecting the set of proposals that maximizes

revenue;

and

  [(4)] constructing a set of winning bids from the set of winning proposals.

8.   (Twice Amended) A method for selecting a set of bids in a combinational auction for at

least two items involving at least one player and at least one type of bid for each player such that

  (a) each item[s] is contained in at most one (or exactly one) selected bid;

(b) for each player, the selected bids all belong to the same type;

and among all collection of bids satisfying (a) and (b) the selected bids maximized total revenue, said method comprising:

[(1)] generating a set of valid [porposals] proposals, each said proposal comprising a collection of bids that can be awarded to a player participating in the auction, said bids being actual bids made and being considered simultaneously;

[(2)] formulating an integer program that includes a column for each proposal, a constraint for each item and a constraint for each player, said constraint representing conditions (a) and (b) respectively, and an objective function which represents revenue;

[(3)] solving a linear programming relaxation of the integer program in said formulating an integer program for obtaining dual variables associated with each of the constrains;

[(4)]using dual variables obtained in said solving a linear programming relaxation for determining the excess value associated with each bid, and a threshold for each player;

[(5)] using a proposal generation method for selecting each player and type, a proposal for which the excess value exceeds the threshold, or determining that no such proposal exists;

[(6] adding the proposal generated in said using a proposal generation method and repeating said solving a linear programming relaxation, said using dual variables, and said using a proposal generation method until no new proposals are identified;

[(7)] solving the integer program that includes all identified proposals; and

[(8)] constructing a set of winning bids from the set of winning proposals.

9.   (Twice Amended) A program storage device readable by a machine, tangibly

embodying a program of instructions executable by the machine to perform method steps for

executing a combinatorial auction, said method steps comprising:

[(1)] reading input data comprising:

[(i)] a plurality of items;

[(ii)] a player bidding on the items; and

[(iii)] a plurality of bids, where each bid specifies the player bidding, the amount

bid, and the list of items included in the bid;

[(2)] generating proposals by utilizing the input data, each said proposal comprising a

collection of bids that can be awarded to a player participating in the auction, said bids being

actual bids made and being considered simultaneously;

[(3)] selecting a set of proposals such that each item[s] is included in at most one selected

proposal; and

[(4)] informing the players bidding on the items of the result of said selecting a set of

proposals.

10.   (Twice Amended) A computer comprising:

(1) means for reading input data comprising:

[(i)] a plurality of items;

[(ii)] a player bidding on the items; and

[(iii)] a plurality of bids, where each bid specifies the player bidding, the amount

bid, and the list of items included in the bid;

(2) means for generating proposals by utilizing the input data, each said proposal comprising a collection of bids that can be awarded to a player participating in the auction, said bids being actual bids made and being considered simultaneously;

(3) means for selecting a set of proposals such that each item is included in at most one selected proposal;

(4) means for informing the players bidding on the items of the results in said means for selecting.